Sinking Skin Flap Syndrome: Rare Stroke Mimic

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Abstract

Sinking flap syndrome is a delayed and rare complication post-craniectomy for patients requiring intracranial intervention, such as traumatic brain injury, subdural hematoma, and intracranial haemorrhage. Several weeks post-procedure, patients can present with varying symptoms, including headache, nausea, vomiting, and, in some cases, focal motor and sensory deficits. Early diagnosis through clinical evaluation and imaging in post-craniectomy patients is important to prevent further neurological deterioration and complications.

Keywords: Sinking Skin Flap Syndrome, Post-craniectomy Complications, Neurological Decline, Titanium Cranioplasty, Intracranial Pressure, Stroke Mimic.

Sinking skin flap syndrome is a rare postoperative complication following craniectomy, marked by sudden neurological decline and sensory deficits. Symptoms encompass new-onset headache, seizures, dizziness, mood changes, and delayed autonomic manifestations like postural hypotension, urinary, and bowel dysfunction. We present the case of a 51-year-old gentleman who, after a fall, exhibited acute right subdural hematoma and intracerebral haemorrhage. Intervention involved embolization, AVM excision, and a right frontal craniectomy. Postoperatively, the patient experienced prolonged agitation. Patient's neurological examination showed power of 4/5 on left side, prompting discharge to a secondary centre for rehabilitation, where he wore a helmet during therapy sessions. Initially responding well to therapy, the patient later developed left-sided weakness and visual inattention and postural instability A repeat CT scan revealed a concave appearance of the craniectomy site and a sunken skin flap (Image A), with midline shift confirming the diagnosis of sunken brain flap syndrome. The patient underwent elective titanium cranioplasty (Image B) at a tertiary centre, resulting in significant recovery.

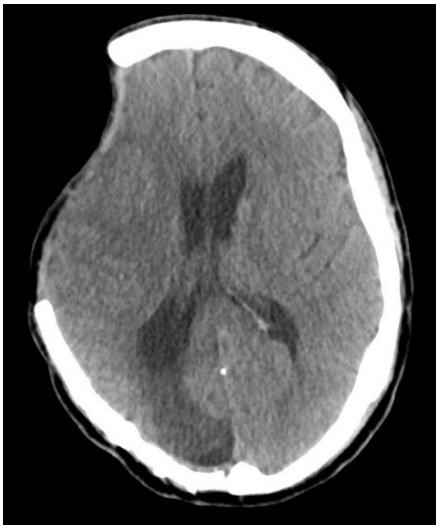

Image A: Sunken Skin Flap, Midline Shift.

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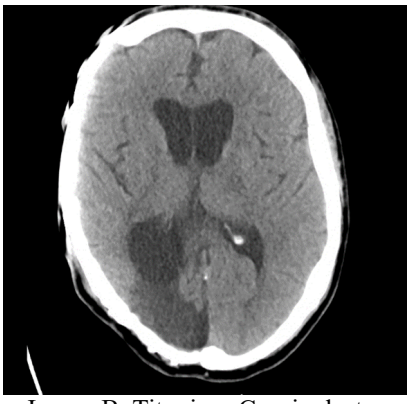

Image B: Titanium Cranioplasty.

Early recognition of symptoms and a multidisciplinary team (MDT) approach facilitate timely intervention, reducing the need for repeat investigations and preventing delays in surgical correction. Sunken brain flap syndrome should be considered in the differential diagnosis of all patients post-craniectomy, emphasizing the necessity of vigilance and proactive management strategies in addressing this delayed complication.

Introduction

Sinking skin flap syndrome was first described by Yang et al.[1] This syndrome represents a rare yet consequential complication following craniectomy procedures, characterized by sudden and often dramatic neurological decline. It occurs in approximately 13% of large craniectomies and tends to develop several weeks to several months after surgery.[2]

It consists of a sunken scalp above the bone defect with neurological symptoms. Other terms like trephined syndrome', 'syndrome of the trephined', 'sinking skin flap syndrome', Paradoxical hernia has been used synonymously.

The phenomenon typically arises after surgical interventions aimed at alleviating intracranial pathologies such as traumatic brain injury, subdural hematoma, or intracerebral haemorrhage, where portions of the skull are intentionally removed to relieve intracranial pressure. While craniectomies are essential for addressing acute neurological emergencies, they can inadvertently lead to the development of sunken brain flap syndrome, posing a substantial clinical dilemma.

Sinking skin flap syndrome manifests through distinctive clinical features, most of the patients present with orthostatic symptoms such as headache, nausea and vomiting. Some may present with seizures. Some patients present with focal neurological deficit which is a rare but recognised manifestation of Sunken skin flap syndrome. often manifesting weeks to months post-operatively. Patients may present with symptoms such as agitation, visual inattention, and motor weakness, which may progress rapidly if left unaddressed. Diagnosis hinges upon meticulous clinical evaluation and diagnostic imaging techniques, which reveal characteristic concavity at the craniectomy site and midline shift, indicative of cerebral descent and distortion of the brain parenchyma..

Discussion

Sinking skin flap syndrome presents a multifaceted clinical challenge, necessitating a comprehensive understanding of its pathophysiology, clinical manifestations, and management strategies.

Aetiology and Pathophysiology

Many hypotheses have been proposed but definitive pathophysiology remains unclear. Sunken brain flap syndrome primarily arises following craniectomy procedures, wherein a portion of the skull is removed to alleviate intracranial hypertension secondary to traumatic brain injury, haemorrhage, or other intracranial pathologies. The removal of the cranial vault disrupts the normal structural integrity of the skull, allowing for cerebral descent and distortion of brain parenchyma. This phenomenon is exacerbated by cerebrospinal fluid dynamics, gravitational forces, and changes in intracranial pressure, leading to the characteristic concave appearance of the craniectomy site and midline shift observed in imaging studies.

Clinical Manifestation

Sinking skin flap typically manifests with sudden neurological deterioration and sensory deficits, underscoring the importance of vigilance in post-craniectomy patient care. Patients may present with agitation, visual inattention, and motor weakness, necessitating a comprehensive evaluation to discern the underlying cause. Understanding the syndrome's clinical implications is crucial for timely intervention and prevention of further neurological decline.

Management

Accurate diagnosis is pivotal in the effective management of sunken brain flap syndrome. Diagnostic imaging, such as CT scans or MRI, plays a central role in revealing the characteristic concave appearance at the craniectomy site and midline shift. The identification of these features is essential for differentiating sunken brain flap syndrome from other potential causes of neurological deterioration, enabling a targeted and timely response.

The cornerstone of sunken brain flap syndrome management lies in a multidisciplinary approach. Neurosurgical consultation is imperative, with cranioplasty emerging as a key therapeutic intervention. Elective titanium cranioplasty has shown significant success in restoring the structural integrity of the skull and reversing neurological deficits. . Ideal time for cranioplasty for hemicraniectomy associated with post malignant syndrome is unknown but there is some evidence to suggest that ideal time to replace the bone flap is 2 to 3 months post craniectomy.[3] Beyond surgical considerations, a comprehensive management strategy involves early recognition of symptoms by staff working in hyper acute

stroke ward, awareness about the rare complication, neurorehabilitation to address residual deficits and optimize functional recovery.

Conclusion

Sinking skin flap represents a complex neurological entity necessitating a nuanced understanding of its pathophysiology and clinical implications. Timely recognition, multidisciplinary collaboration, and tailored therapeutic interventions are essential in optimizing patient outcomes and mitigating long-term neurological sequelae.

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